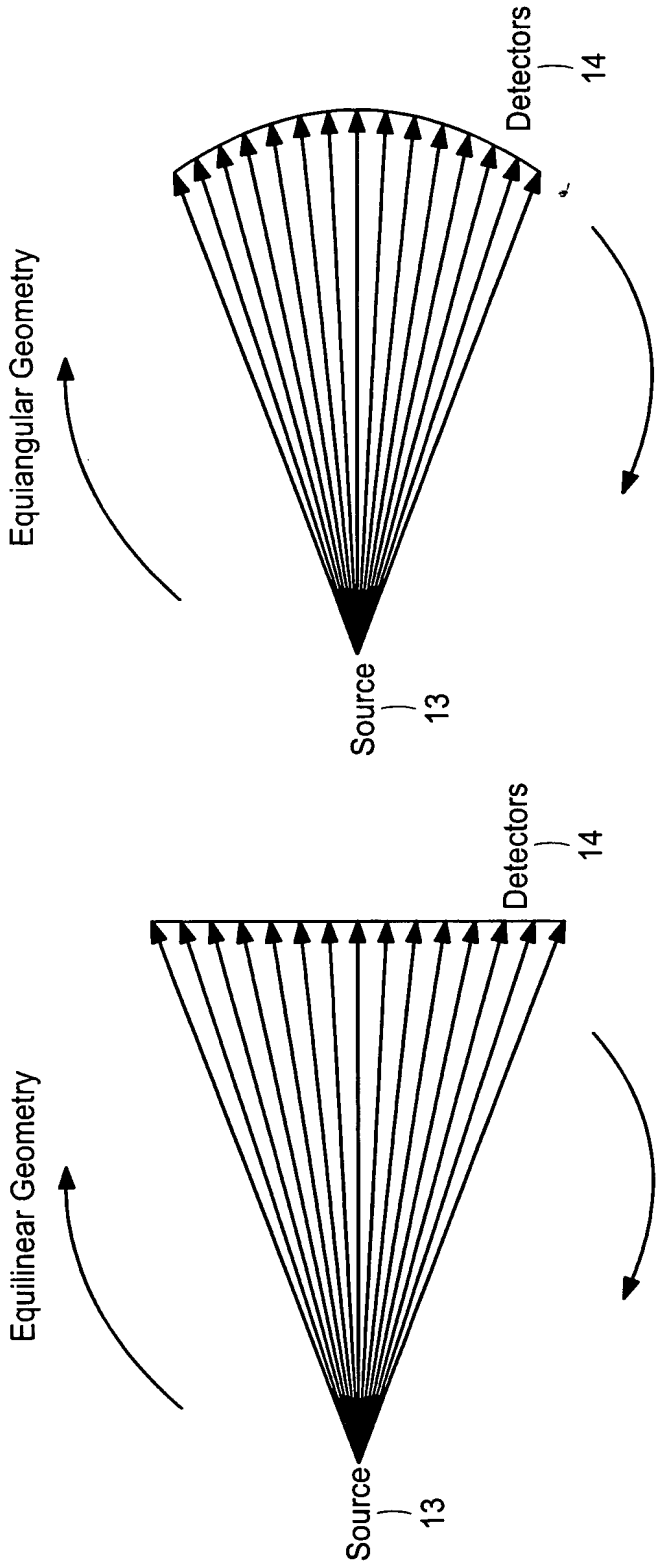

FIG. 1

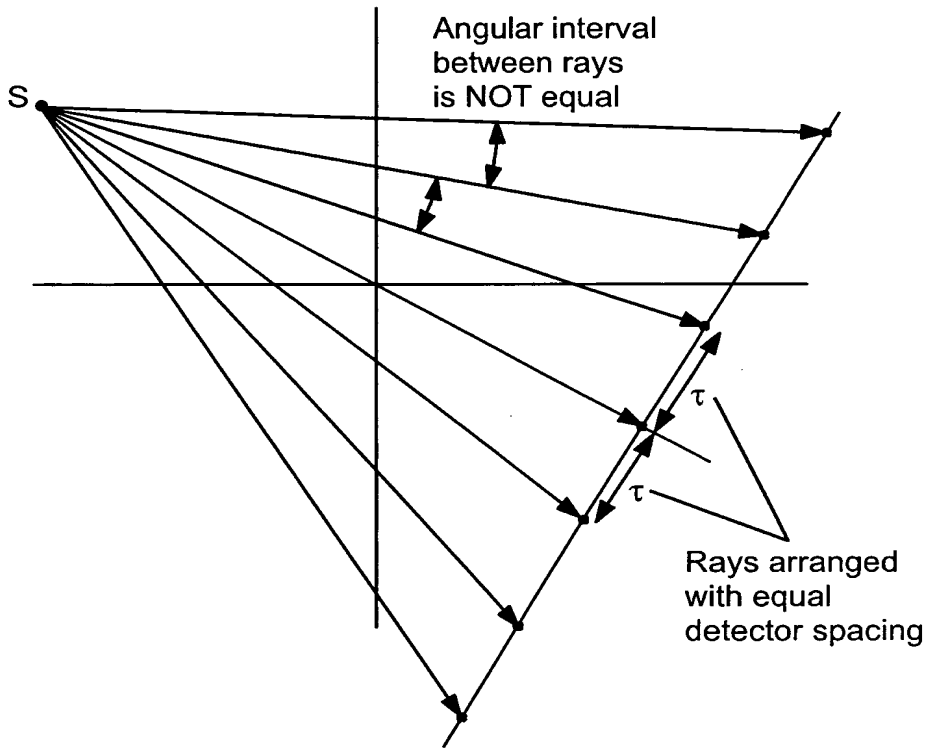
Angular interval
between rays
is NOT equal
S
τ
τ
Rays arranged
with equal
detector spacing

FIG. 2

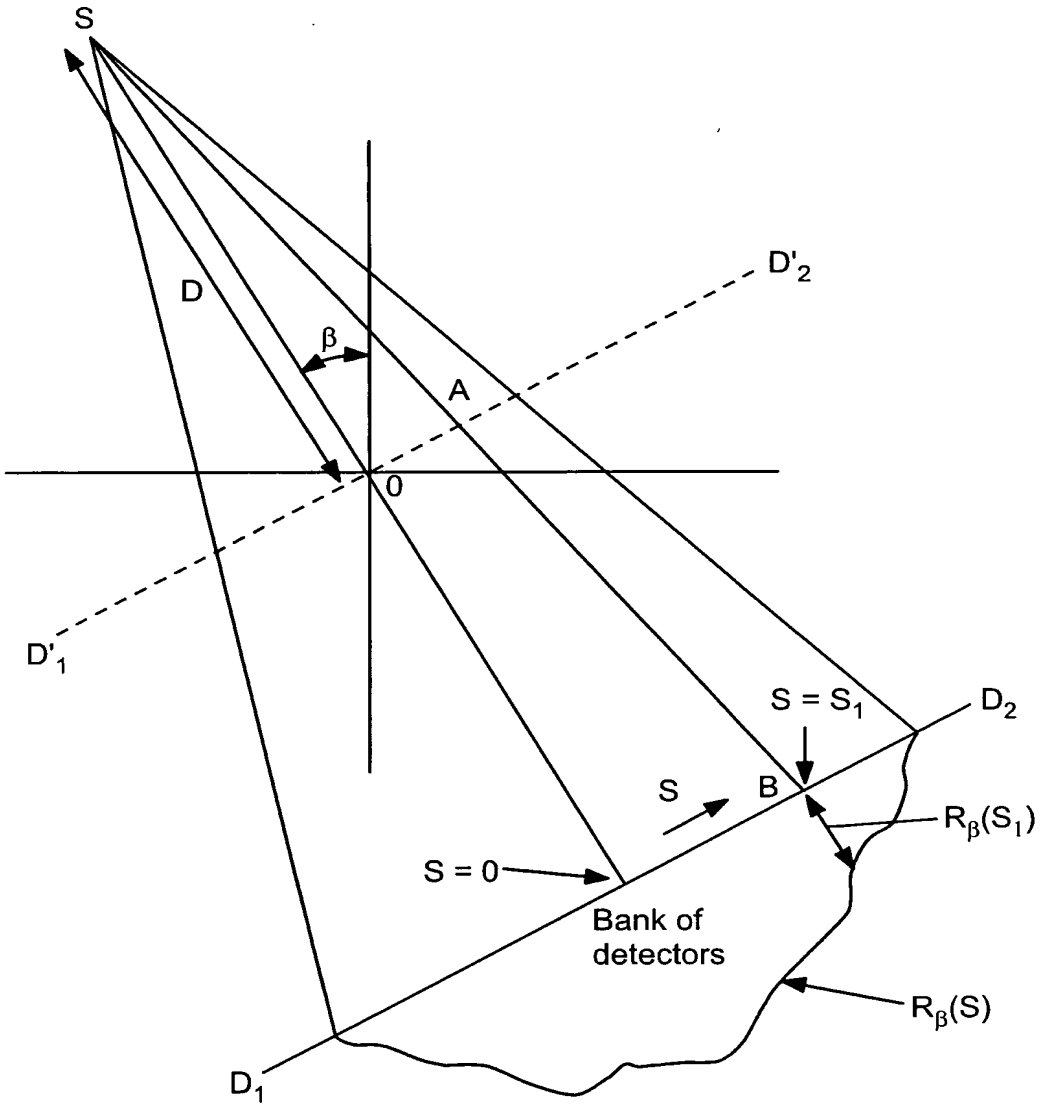

FIG. 3

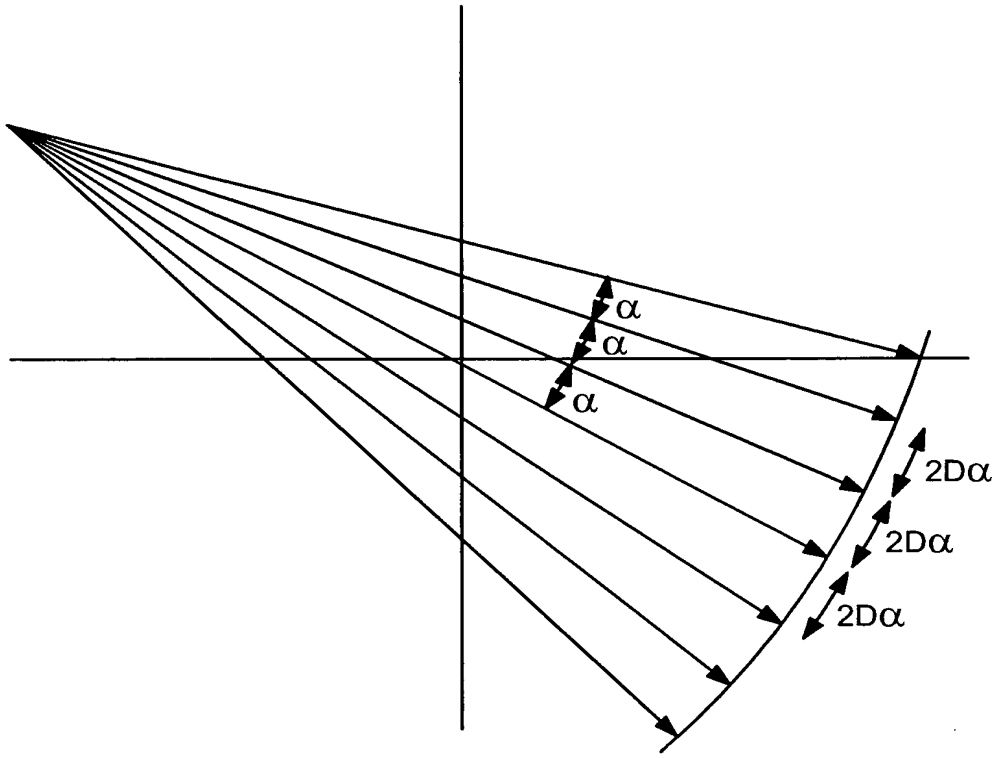

FIG. 4

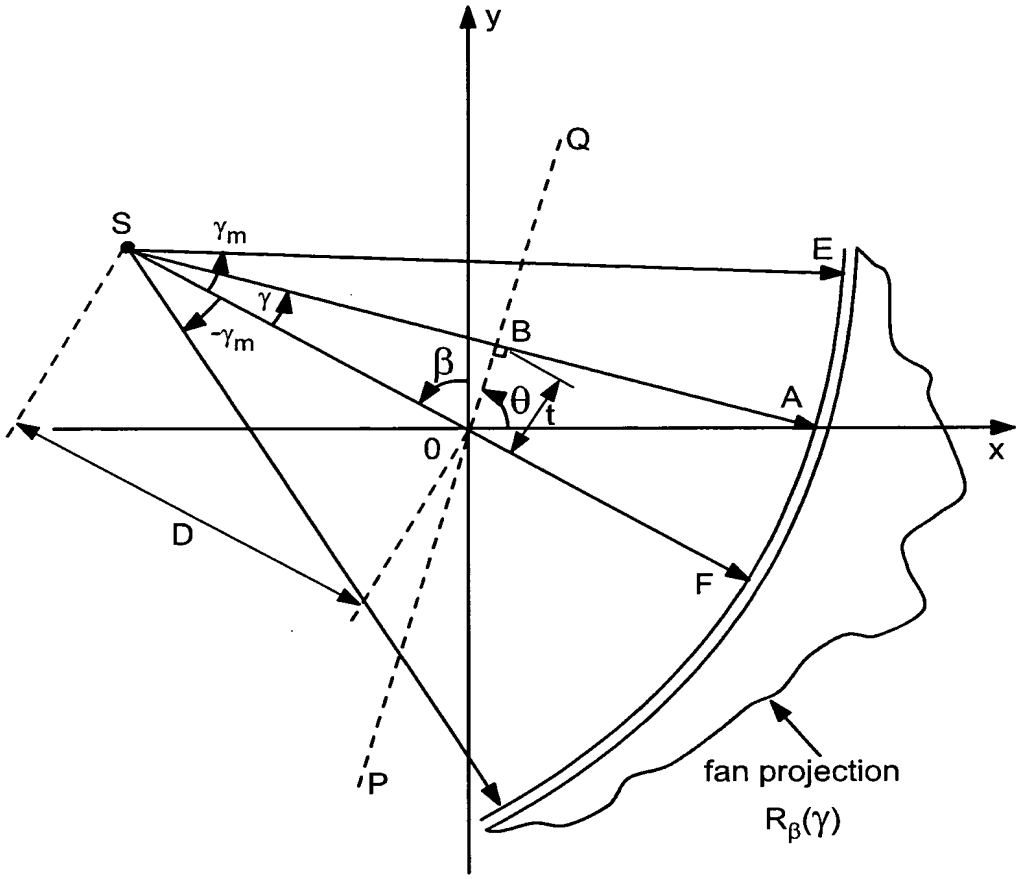
y
Q
S
γ_m
E
γ
$-\gamma_m$
B
β
θ
t
A
0
x
D
F
P
fan projection
$R_\beta(\gamma)$

FIG. 5

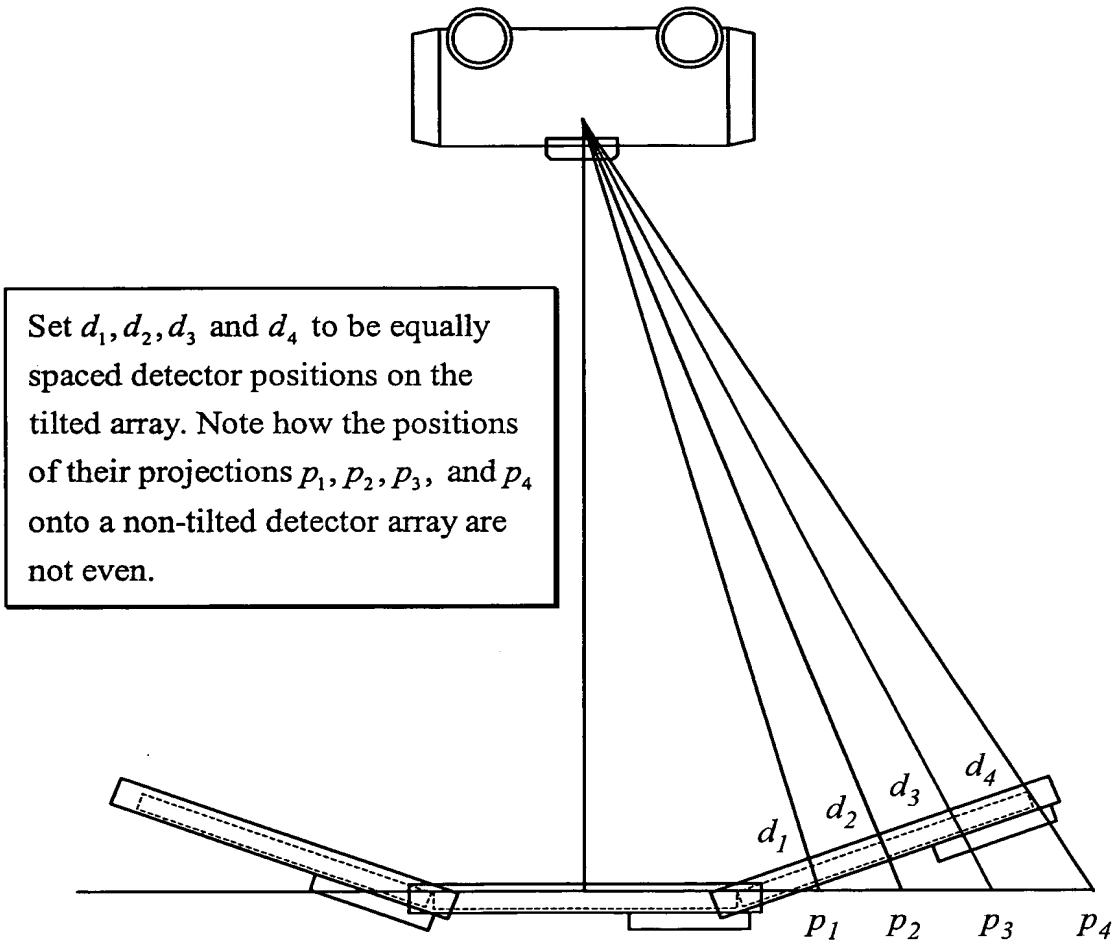
Set d_1, d_2, d_3 and d_4 to be equally spaced detector positions on the tilted array. Note how the positions of their projections p_1, p_2, p_3, and p_4 onto a non-tilted detector array are not even.
d_1
d_2
d_3
d_4
p_1
p_2
p_3
p_4

FIG. 6

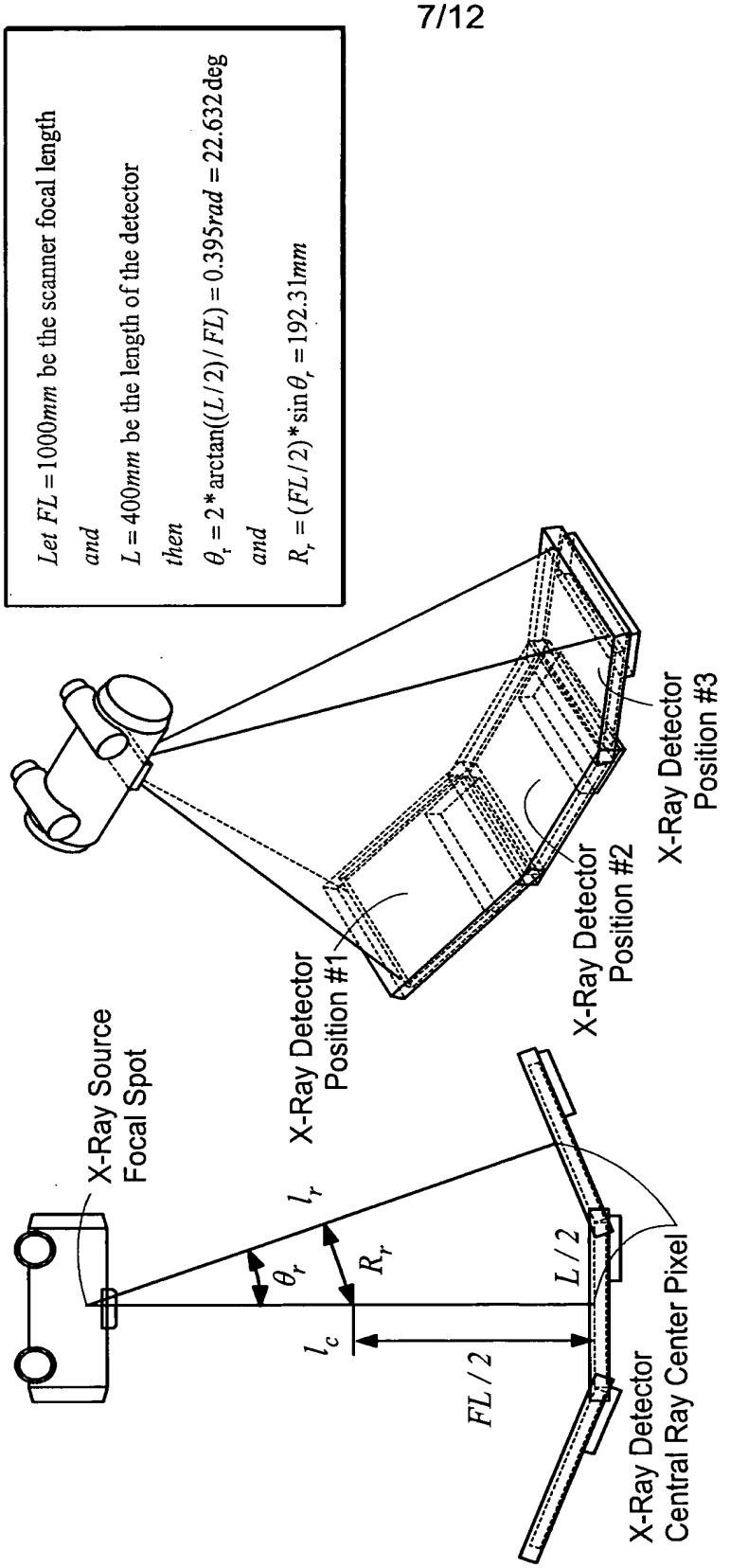
Let $FL = 1000mm$ be the scanner focal length
and
$L = 400mm$ be the length of the detector
then
$\theta_r = 2 * \arctan((L/2)/FL) = 0.395rad = 22.632\deg$
and
$R_r = (FL/2) * \sin\theta_r = 192.31mm$
X-Ray Source Focal Spot
X-Ray Detector Position #1
X-Ray Detector Position #2
X-Ray Detector Position #3
l_r
θ_r
R_r
l_c
$FL/2$
$L/2$
X-Ray Detector Central Ray Center Pixel

FIG. 7

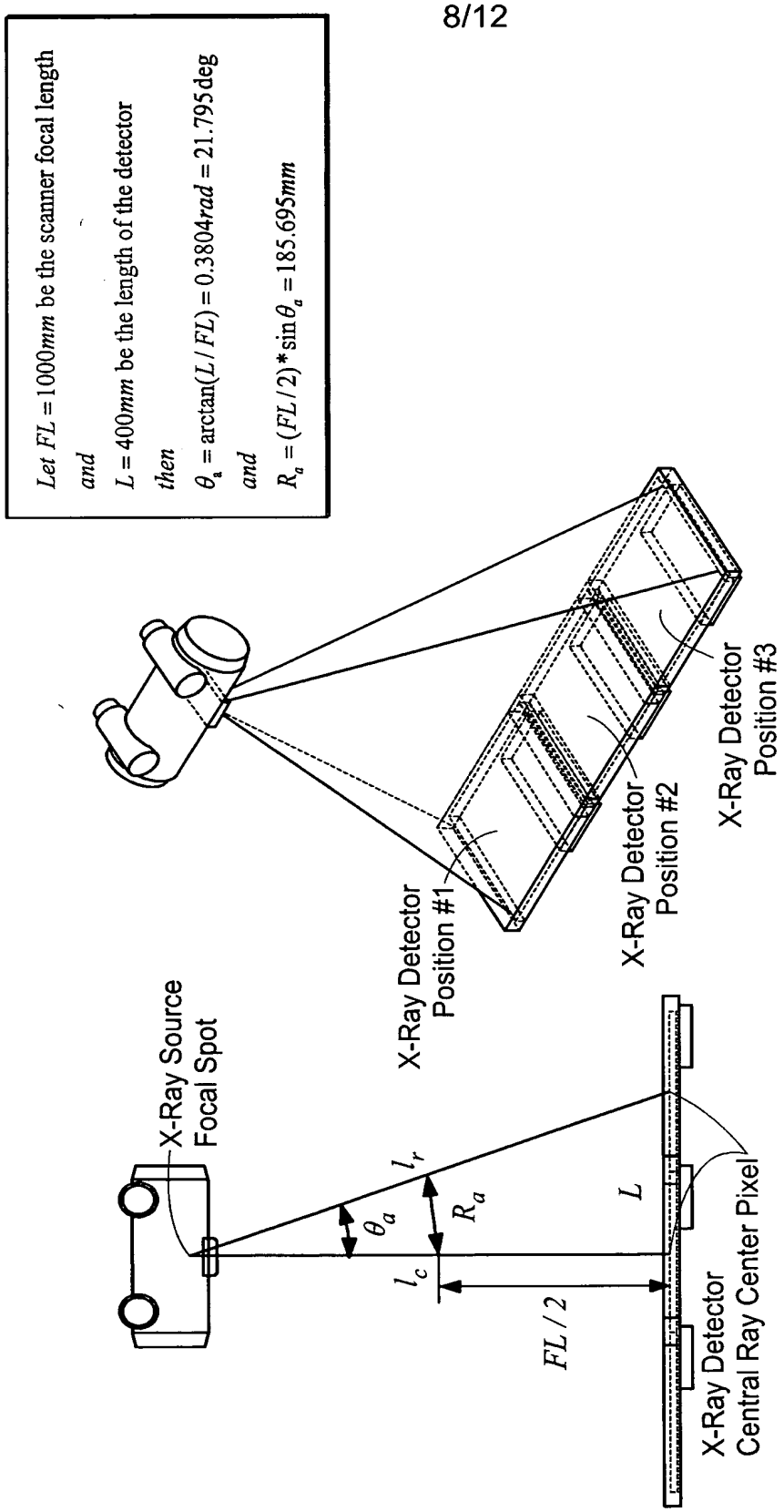
Let $FL = 1000mm$ be the scanner focal length
and
$L = 400mm$ be the length of the detector
then
$\theta_a = \arctan(L/FL) = 0.3804rad = 21.795\deg$
and
$R_a = (FL/2) * \sin\theta_a = 185.695mm$
X-Ray Source Focal Spot
X-Ray Detector Position #1
X-Ray Detector Position #2
X-Ray Detector Position #3
X-Ray Detector Central Ray Center Pixel
l_r
θ_a
R_a
l_c
L
$FL/2$

FIG. 8

FIG. 9

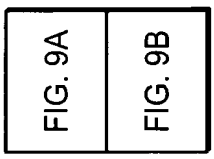
FIG. 9A
FIG. 9B

START
100
iproj = 1
101
Rotate to projection angle [1...nproj]
102
Allocate new virtual equiangular or equilinear detector array P
103
For each projection angle iproj acquire real detector arrays D [1...ndet]
104
idet = 1
105
1
2
START
108
Loop through virtual equilinear or equiangular detector array pixels p [1...npix]
109
3
4

FIG. 9A

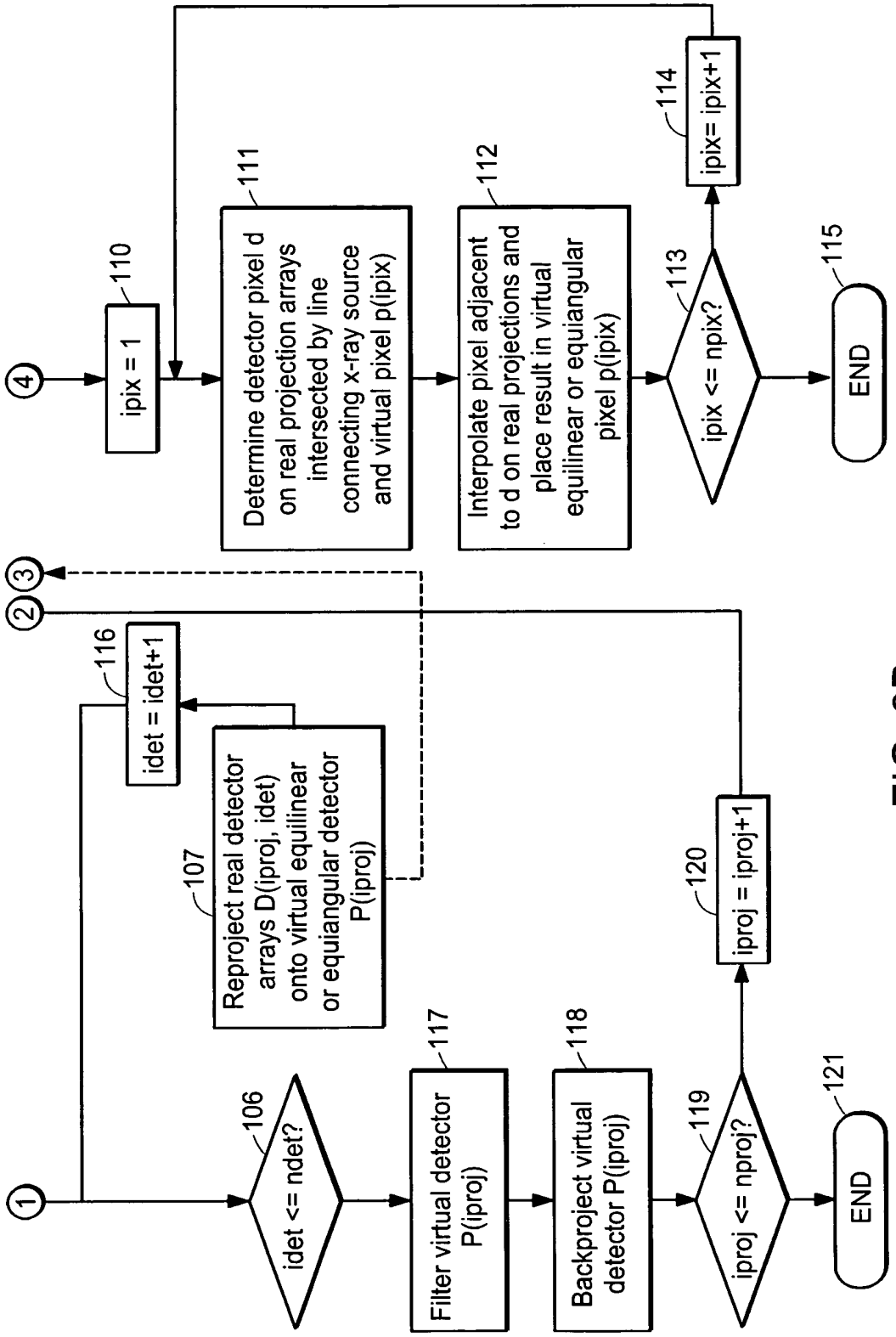
1
2
3
4
106
idet <= ndet?
107
Reproject real detector arrays D(iproj, idet) onto virtual equilinear or equiangular detector P(iproj)
110
ipix = 1
111
Determine detector pixel d on real projection arrays intersected by line connecting x-ray source and virtual pixel p(ipix)
112
Interpolate pixel adjacent to d on real projections and place result in virtual equilinear or equiangular pixel p(ipix)
113
ipix <= npix?
114
ipix= ipix+1
115
END
116
idet = idet+1
117
Filter virtual detector P(iproj)
118
Backproject virtual detector P(iproj)
119
iproj <= nproj?
120
iproj = iproj+1
121
END

FIG. 9B

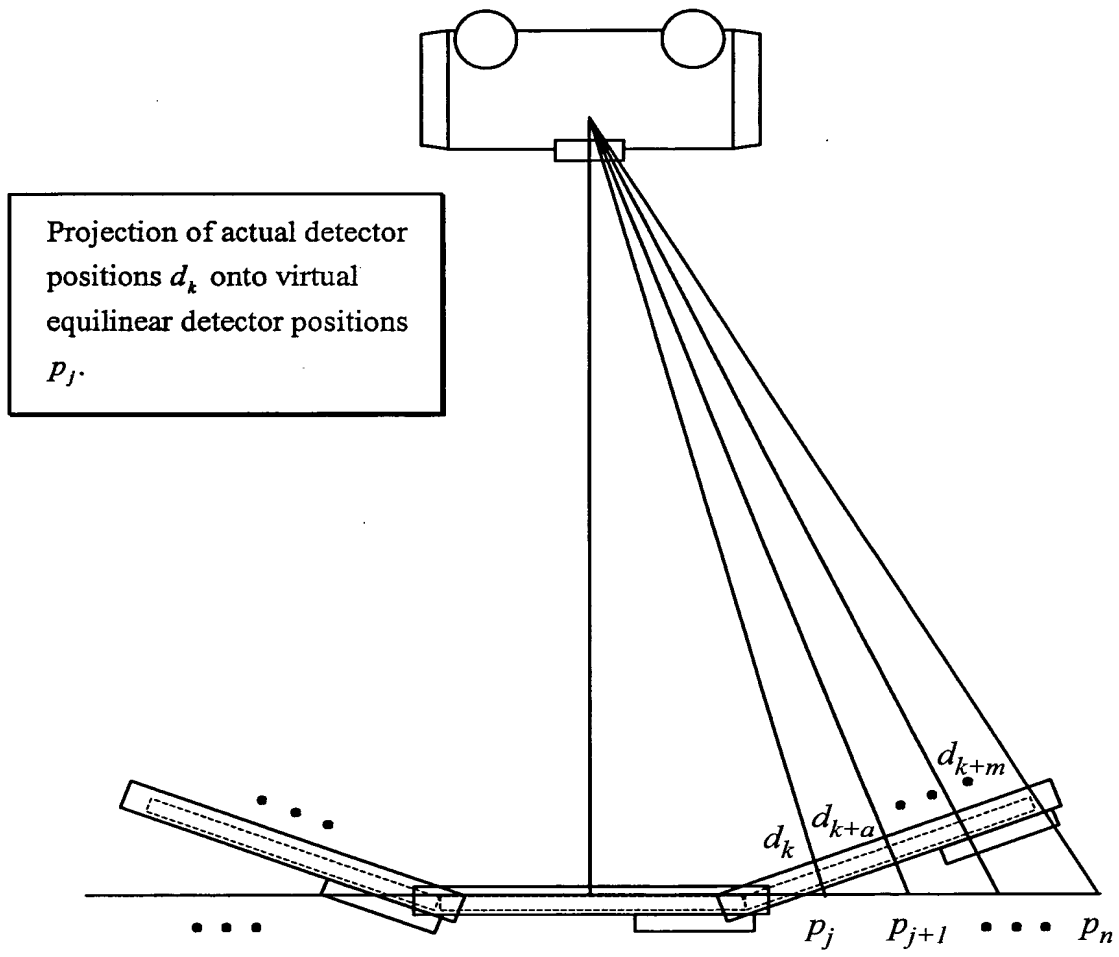
Projection of actual detector positions d_k onto virtual equilinear detector positions p_j.
d_{k+m}
d_{k+a}
d_k
p_j
p_{j+1}
p_n

FIG. 10

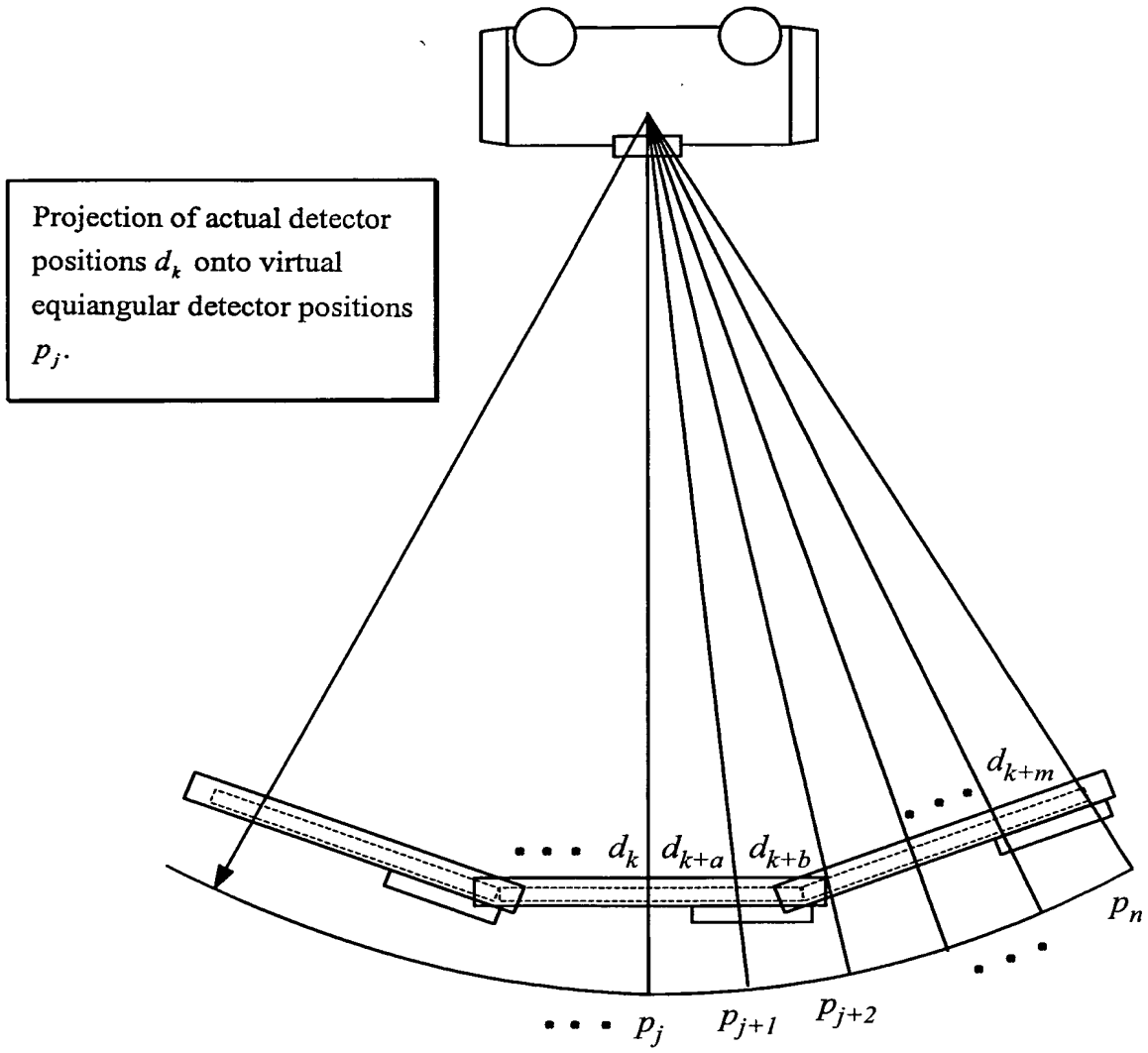
Projection of actual detector positions d_k onto virtual equiangular detector positions p_j.
d_{k+m}
d_k
d_{k+a}
d_{k+b}
p_n
p_j
p_{j+1}
p_{j+2}

FIG. 11